"Some of the large species of plants have been determined. DAUBENTON describes the *Lichen rangiferinus* and *digitatus*, plants possessed of forms which no minerals could imitate."

This account is accompanied with an engraving of a plant (a hypnum) occurring in Chalcedony, which agrees with a few in my collection; but a great many others, I dare say, are undescribed plants in a fossil state, and worthy the notice of the scientific world.

It cannot be otherwise than interesting to the Geologists of Europe, as well as to those in India, to have a description of the various species of fossil plants occurring in the Sone agates, with engravings of a few of the largest ones; and I will endeavour shortly to supply such a desideratum through your Journal as the fittest for such a purpose.

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## VIII.—*Chemical Analyses. By* JAS. PRINSEP, *Sec. &c.*

Under this head we propose to insert the examinations of various substances sent to us by friends, of which they will be better able to look for the results here than in detached miscellaneous notices.—ED.

### 1.—*Saltness of the Red Sea.*

The *Hugh Lindsay*, Steamer, having given currency to the report that the Red Sea contained more salt than the ocean, and that in consequence she had been obliged to blow off much more frequently while in that part of her voyage, Lieutenant BURNES, on his return to India on board of her, took the precaution of filling two bottles, one with the water of the Red Sea, the other with that of the Arabian Sea, which he was so kind as to send to me under charge of Lieutenant FRASER. (See Proc. Asiatic Society, page 410.)

After being allowed to stand for some hours side by side, to acquire the same temperature, their specific gravity was taken in the most accurate manner.

No. 1, Arabian Sea water, spec. grav. 1·0254 at 86°·1
2, Red Sea water,..... 1·0258 at 86°·2

The difference is certainly in favor of the latter, but it is much too small to cause any sensible effect in the blowing off.

Equal portions of the two were then analysed by the usual chemical tests, although the hydrometer result would have been quite sufficient to found a judgment upon. It was thought that perhaps the lime might be in excess in the one case, and thus cause a quicker incrustation in the boilers; but both waters on evaporation began to be turbid at the same time. The analysis was chiefly directed to the determination of the sulphuric acid and lime, the rest being performed in a rapid manner: the results were as follows on one cubic inch of each:

| | *Arabian Sea.* | *Red Sea.* |
|---|---|---|
| Sulphuric acid, thrown down with barytes, | 1·82 grs. | 1·80 |
| Lime, precipitated by oxalate of ammonia, | 0·70 | 0·82 |
| 1000 grs. gave, with nitrate of silver, chloride of silver,..... | 80·00 | 81·95 |
| = chloride of sodium, or common salt, | 32·8 | 33·5 |

Although, however, the sea in mid channel may not differ materially from the broad ocean in its contents, it may be possible that in insulated positions near shore, under a fierce sun, concentration may proceed to a considerable extent—this is the only way in which I can account for the very different result published in the London Literary Gazette, on the authority of Dr. Ure's analyses quoted in Mr. Wilkinson's work on Egypt.

The following is the paragraph alluded to:

"During my stay on the coast of the Red Sea, I had occasion to observe the remarkable saltness of its water, and succeeded in ascertaining that it contained much more saline matter than the ocean. I have since been favoured by Dr. Ure with the analysis of some water brought by me from Berenice, from which it results that the specific gravity is 1·035; that 1000 grains of water contain 43 of saline matter, of which about four grains are muriate of lime, with a little muriate of magnesia, and the remainder muriate of soda, with a little sulphate of magnesia. The specific gravity of water of the open ocean in the same latitude is only 1·028, and contains not more than 36 grains of saline matter in a similar quantity."

To which the author attaches a note, explaining, that "after the vernal equinox, the Red Sea is lower in winter; but the prevalence of the south wind after the month of September causes a considerable rise of its level."

The difference in the two cases is not more than may reasonably be explained in the above manner. The hydrometer is in all cases the safest test, and it is a pity that it had not been resorted to in the steam navigation of the Mediterranean, which has been the source of such contradictory statements.

2.—*Native Carbonate of Magnesia from South India.*

In my analysis of the Nerbudda dolomite, published in the *Gleanings in Science*, vol. I. p. 267, I expressed a desire to obtain some of this mineral, stated by Dr. Thomson to form "whole rocks in Hindustan, and to contain much less carbonic acid than it ought," though he was curious to know whether the interior portions of the mountain might not have their full proportion.

My wish has at length been gratified by Dr. Malcolmson, Sec. Med. Bd. at Madras, among whose specimens, recently presented to

the Society, are several lumps of this curious mineral. Dr. M. writes:

"The native carbonate of magnesia from Salem has again attracted attention. I at first supposed it to be a magnesite, from the great difficulty of dissolving it, but subsequent observation proved it to contain no silex. Its composition would seem to be, carbonic acid 47·5; water 4·0*; magnesia 48·5. As it is likely to become an article of commerce, and the statements regarding it are contradictory, I send some for your re-examination. It occurs in thin veins (from an inch to a foot), and also, (it is said,) in beds."

As the atomic weight of magnesia differs materially in different chemical works, I was anxious to make use of this mineral to set the matter at rest, and decide whether Berzelius, Thomson, or Brande was most to be trusted.

Three careful experiments proved, that the water contained was 0·8 per cent., while the slight adulteration of silica left, on dissolving 100 grs., was only 0·3; traces of alumina and oxide of iron were visible in the form of a delicate brown gelatinous film on adding ammonia to the solution, but none of lime, even after adding sulphuric or oxalic acid, evaporating to dryness, and redissolving in distilled water. The solid impurities, therefore, being set against the gaseous, as nearly in the proportions of the magnesian salt itself, it is evident that simple calcination of the solid mineral will give a very exact view of its constituent proportions.

Ten specimens of 100 grs. each, treated in this manner, returned from the fire, weighing respectively, 49·67, 48·26, 48·20, 48·40, 48·40, 48·38, 48·39, 48·33, 48·37, and 48·38. The first of these was in the solid form, and therefore may not have been thoroughly calcined: the average of the rest gives,

| | | |
|---|---|---|
| Magnesia,.... | 48·34 by Berzelius | 48·31† |
| Carbonic acid, | 51·66 | 51·69 |
| | 100. | 100. |

or almost precisely the composition according to this accurate chemist—which it may be remembered was the only one which would agree with my analysis of the *Jabalpur* dolomite, a definite crystallized compound of one atom of carbonate of lime and one of carbonate of magnesia.

To prove that no influential quantity of carbonic acid was retained, two of the specimens were dissolved in dilute nitric acid, in a closed glass tube—the gas extricated was less than the 50th of a cubic inch.

* Dr. Malcolmson afterwards corrects this error. A part of the carbonic acid was driven off with the water.

† By Dr. Thomson, *M.* 46·2 *C. A.* 53·8; by Brande *M.* 47·2; *C. A.* 52·8.

The mineral was found to differ considerably in weight from the statements of Thomson and Phillips—the specific gravity of two specimens being 2·970, and 2·897, at the temperature of 85°. A good deal of air was given off on its first immersion into water, and it adhered to the tongue.

Another point to be ascertained, from this mineral, was, whether the circumstance I noticed on the occasion alluded to, would hold true, viz. that calcined magnesia would not become a hydrate, like lime, on slaking, and that this earth might thus be recognized in mixtures.

Three of the calcined specimens were treated with water, which disengaged considerable heat, and then exposed in a receiver, over concentrated sulphuric acid, to be ridden of hygrometric moisture. After 30 hours, they weighed respectively 60·45, 58·7, 60·9 grs., shewing an average excess of 10·0, which is about half an atom of water (9·8). This result is so unexpected that it requires further examination, which I hope to be able to give hereafter.

### 3.—*Tin from Malacca.*

Cast blocks of the metal of the principal mines, as prepared for sale, were transmitted by Ensign Newbold. With reference to my observation in the 3rd vol. of the Gleanings, I was contented to test their purity by the specific gravity, which was as follows :—pure tin, at the same temperature, 84°·5, being about ..... 7·290

| | | | |
|---|---|---|---|
| No. 1, | from | Naning..... | 7·317 |
| No. 2, | ,, | Srimenanti (new mine) ..... | 7·262 |
| No. 3, | ,, | Jompole..... | 7·287 |
| No. 4, | ,, | Sungie Oojong..... | 7·223 |
| No. 5, | ,, | Lúkút in Salangore..... | 7·349 |
| No. 6, | ,, | Rumbowe..... | 7·256 |
| No. 7, | ,, | Jelaboo..... | 7·314 |
| No. 8, | ,, | Perak..... | 7·299 |

Two specimens of the ore also accompanied :—

No. 1, from Lúkút, a fine grained black oxide of tin, had a specific gravity of 6·74, and yielded a produce of 70 per cent. of very good metal, on simple fusion, with black flux.

No. 2, from Srimenanti, was in much larger grains or lumps. It weighed, however, only 6·64 ; and yielded only 52½ (?) per cent. of metal—giving off some sulphur in the fire. It is therefore inferior to the former, but probably not to the extent stated in the above crude and single reduction.

### 4.—*American Self-generating Gas Lamp.*

Mr. Longueville Clarke has one of these curious and ingenious lamps, which are something on the principle of the little floating

candlesticks without oil, invented, I believe, by Woolaston. A metal stem passes down into the liquid, and, once heated, is afterwards kept warm by the burning vapour, which it causes to rise and issue from the gas-jets encircling the stem. Some mystery is made about the liquid, but its analysis proves to be very simple.

Specific gravity, ·760 at 32°; easily volatile, with a smell of turpentine. 100 grs. allowed to evaporate spontaneously, left barely a trace of solid matter—resinous. 100 parts, mixed with water in a measured tube, turned white, and 15 parts of pure colourless turpentine finally settled at the top of the watery emulsion. In fact, a mixture of 85 alcohol, and 15 turpentine was found to possess precisely the qualities of the liquid, burning with a clear flame, and without smell.

It is necessary to use the oil of, and not the rectified, turpentine, which latter is well known not to be soluble in alcohol.

*5.—Native Remedy for the Spleen.*

The late Dr. Twining gave me some pills used by the natives as a cure for the spleen. They proved to contain nothing but sulphate of copper, mixed up with meal and mucilage.

*6.—Three bottles of Water from Hot Springs in Assam.*

Captain Jenkins is anxious for the result of their examination; but I really am uncertain of two, which arrived in a dirty and odorous state—one, No. 3, containing an abundant putrid yellow scum, which appeared like a compound of bitumen and sulphuretted hydrogen, but was not further examined. No. 1, was a clear sweet water, having a specific gravity, ·9964 at 91°, and containing only common salt.

*7.—Mineral Water from Ava.*

Captain Macleod favoured me with a bottle of water from the lake near the Khyendwen river, whence a mineral salt is obtained. It had a spec. grav. of .9985 at 88°, and was consequently nearly pure. But a second bottle, filled from a well only three feet from the same lake, weighed 1·0006 at 88°, and yielded a copious precipitate to muriate of barytes, and nitrate of silver, shewing it to contain a mixture of sulphates and muriates, which are extracted by the people of the neighbourhood.

*8.—Hot Springs in the Mahadeo hills, (see Vol. III. p. 390.)*

The two bottles sent me by Dr. Spilsbury were so nearly pure, that it was not worth while to examine them further than by the hydrometer.

*9.—Minerals from Moulmien.*

The following are, I believe, the correct names of the specimens obligingly sent by Lieut. Foley, in June. Nos. 1, 4, 16, irom pyrites; 2, galena; 3, sulphuret of antimony; 8, 9, hydrated oxide of iron, hæmatitic; 10, fibrous gypsum; 11, magnetic oxide of iron; 12, 14, 17, granite with pseudo-metallic mica; 13, black oxide of tin.

10.—*Sulphuret of Molybdenum.*

This was put into my hands by a mercantile house in Calcutta, without however noticing whence it came.

It resembled graphite or plumbago so exactly in its qualities of drawing traces on paper, of being unaltered in the fire, and very gradually disappearing, that I should have been contented with these appearances, had not its specific gravity, 4·64 to 4·5, been so much higher than that of graphite, (1·4.) When heated also, white fumes, devoid of smell, or slightly sulphurous, were perceived at the moment of withdrawal from the fire.

It was digested with disengagement of red fumes in nitric acid; leaving a white insoluble precipitate in the filter, weighing 74·4 per cent. The liquid gave immediate evidence of sulphuric acid, that had been formed from the sulphur present. The white mass acted in all respects like molybdic acid, and was known to be so from its peculiar property of turning instantly blue on contact with metallic iron, lead, copper, or silver: a fact, I believe, not hitherto noticed: water is required to produce this effect. Heated red with carbonate of soda, the metal was reduced with effervescence.

I am not aware that this singular mineral is turned to any profit, but it is desirable to ascertain where it has been discovered. The high specific gravity of the Ceylon graphite, 2·37, leads me to imagine that I may have mistaken that mineral also, and invites further inquiry. It may be remembered*, that in an English cabinet of minerals, a metallic ore was also found substituted for the true Borrowdale plumbago.

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IX.—*Horary Meteorological Register for Calcutta. By* Jas. Prinsep, *Sec. &c.*

The 21st September having been appointed one of the days for the combined series of horary observations, by the Meteorological Association, I could not allow it to pass without an attempt to fulfil the prescribed terms, even at the sacrifice of a night's rest.

The weather was not very favorable, although such as might be expected near the equinox: the barometer was gradually falling, indicative of blowing weather; which in fact followed a few days afterwards. The occasional violent showers checked the course of the thermometer and hygrometer; and the minimum temperature noted, was that of the rain, rather than that of radiation to the sky. As a different barometer was necessarily used during the night, care was taken to continue its readings during the day, to obtain an accurate comparison with the standard instrument at the Assay Office. The difference—·017, has been added, to bring the whole to terms of the

* See Analysis of Graphite, Gleanings, vol. III. p. 180.